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## What is claimed is:

- 1. A thin-film crystal wafer having a pn junction comprising:
- a first crystal layer of p GaAs; and
- a second crystal layer of n  $In_xAl_yGa_{1-x-y}P$  ( $0 \le x \le 1$ ,  $0 \le y \le 1$ , x + y = 1),

the first and second crystal layers being lattice-matched layers that form a heterojunction; wherein

- a thin film layer of  $In_xAl_yGa_{1-x-y}P$  ( $0 \le x \le 1$ ,  $0 \le y \le 1$ , x + y = 1) differing in composition from the n  $In_xAl_yGa_{1-x-y}P$  of the second crystal layer is formed at an interface of the heterojunction.
- 2. A thin-film crystal wafer having a pn junction as claimed in claim 1, wherein the second crystal layer and the thin-film layer each has a y value of 0.
- 3. A thin-film crystal wafer having a pn junction as claimed in claim 1, wherein the thin-film has a band gap in the range of 1.75 eV 2.10 eV.
- 4. A thin-film crystal wafer having a pn junction as claimed in claim 1 or 2, wherein the thin-film layer has a thickness of not less than 10 Å and not greater than 100 Å.
- 5. A thin-film crystal wafer having a pn junction as claimed in claim 1 or 2, wherein the thin-film layer is formed to be considerably thin in comparison with the first and second crystal layers.
- 6. A method of fabricating a thin-film crystal wafer having a pn junction, for use in fabricating a heterojunction bipolar transistor, by successively overlaying compound semiconductor crystal layers on a GaAs substrate, the method comprising:

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a step of forming a base layer composed of p GaAs crystal;

a step of forming on the base layer a thin film layer of  $In_xAl_yGa_{1-x-y}P$  ( $0 \le x \le 1$ ,  $0 \le y \le 1$ , x + y = 1) whose lattice constant differs from the lattice constant of the p GaAs crystal layer; and

a step of forming on the thin film layer an emitter layer composed of n  $In_xAl_yGa_{1-x-y}P$  ( $0 \le x \le 1$ ,  $0 \le y \le 1$ , x + y = 1) crystal whose lattice constant is the same as the lattice constant of the p GaAs crystal layer.

- 7. A method of fabricating a thin-film crystal wafer having a pn junction as claimed in claim 6, wherein the y value is 0.
- 8. A method of fabricating a thin-film crystal wafer having a pn junction as claimed in claim 6, wherein the x value of the In component of the emitter layer is 0.48.
- 9. A method of fabricating a thin-film crystal wafer having a pn junction as claimed in claim 6, wherein the thin-film has a band gap in the range of 1.75 eV 2.10 eV.
- 10. A method of fabricating a thin-film crystal wafer having a pn junction as claimed in claim 6 or 7, wherein the thin-film layer has a thickness of not less than 10 Å and not greater than 100 Å.
- 11. A method of fabricating a thin-film crystal wafer having a pn junction as claimed in claim 6 or 7, wherein the thin-film layer is formed to be considerably thin in comparison with the first and second crystal layers.

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